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In Conjunction With

American Institute of Biological Sciences

UNIVERSITY OF WISCONSIN, MADISON, WISCONSIN

September 7-8-9, 1953

– INFORMATION ON HOUSING –

DORMITORY ACCOMMODATION: University Dormitories will be available for housing. Couples and families will be accommodated in hotels, motels and private homes near the campus.

DORMITORY ROOMS MAY BE OCCUPIED: Any time from noon on Sunday, September 6th until 10 a.m. on Friday, September 11th.

COST OF ROOM AND MEALS PER PERSON IN DORMITORIES: Sunday evening to Thursday including breakfast: $21.50. Deductions for luncheons and banquets scheduled by Societies will be made. For those occupying dormitories for shorter periods some adjustment will be made.

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Arrival: By Train............... By Plane............... By Car...............

Expected Time of Arrival....................................... Of Departure: ....

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TRENDS IN POTATO PRODUCTION AND SALES, 1940-1950[1]

Robert A. Fitzpatrick[2]

Analysis of statistics on production, total sales, and government purchases of potatoes during the latter part of the period 1940-1950 indicate that, on the national level, total production and total sales continued to rise while commercial sales were falling. The spread between total and commercial sales tended to increase as government purchases made up larger proportions of total sales.

The national experience, however, was not repeated uniformly in all states and areas. Some states and areas showed relative differences in gains or losses of commercial sales, and participated to varying extents in selling for price support.

By the end of the support period, the national pattern of production and marketing had changed in such a way that some areas, *e.g.*, California (early), had gained a larger share of the commercial supply than it formerly had. Other areas, *e.g.*, Maine, had lost. In other words, some states experienced slight change in their competitive status—as measured by commercial sales—, some lost ground, and some gained.

The support program, purely of itself, does not appear to have brought about changes in the local, regional, and national marketing structure, but it was one of several related factors in the transformation. A major outside influence, potato imports from Canada, was instrumental in causing local dislocations, particularly in the Northeast. In one year, for example, Canadian potatoes were selling at Boston below support, whereas the government was buying Massachusetts and Maine potatoes for support.

Another major influence was the supply originating from farms which were not enrolled in the support program and, hence, were not bound by the acreage allotment feature which was instituted to combat surpluses. This portion of the supply was marketed under the support price "umbrella".

It is possible that improved technology, under competitive conditions, would have eventually altered the interregional production and marketing scheme. It is also possible that the alterations that did occur were facilitated or accelerated by the support price structure.

Finally, there is evidence that, in some localities, growers did not extend themselves to seek and develop competitive outlets while the alternative of sales for price support could be exploited.

While the support program was operating, many people in the potato industry felt that basic changes were taking place in the structure of the industry. Such terms as lost markets, changed marketing patterns, and so on, were commonly heard. By using available statistics, it is now possible

[1]Accepted for publication March 18, 1953.
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to isolate, as it were, the support period in order to find what, if any, trends underlay the year-to-year fluctuations in production and sales. Trends that can be observed indicate that changes did occur and that price support was involved in the changes.

A broad view of developments can be obtained by an analysis of the total U.S. production and sales on a *per capita* basis. This approach adjusts the basic data for the effect of a steadily increasing population. The data and trends derived from them are shown in figure 1. (Total sales include government purchases, commercial sales do not).

It is evident that different patterns of growth and decline in the three series existed during the selected period. The United States production *per capita* shows growth from 1940 to 1945, and thereafter declines. Total sales shows a similar trend, but growth is steadily upward until 1948—three years after the downturn in the production trend. Commercial sales reveal a different history. Here, growth is evident from 1940 to 1943, and then a sharp decline begins. Of particular significance in analysis of these trends is the ever-widening gap between total and commercial sales during the period in which substantial government purchases were made, *i.e.*, from 1943 through 1950.

The total population was increasing steadily throughout the period 1940-1950, and this increase helped to retard the commonly recognized decline in potato consumption *per capita*. The fall in commercial sales is partially accounted for in the drop in consumption *per capita*, but the rise in total sales seems paradoxical by comparison. A reasonable assumption might be that government surplus removal between 1945 and 1950 sustained production and total sales at high levels.

A state-by-state analysis of these trends can be made, but for present purposes, it is sufficient to point out developments in the major areas, such as Early, Surplus Late, *etc.*, and also in those states which showed marked departures from the norm. Considering the major areas, it is evident (Figure 2) that each area did not duplicate the national experience in growth and decline in production. The original data on production have not been shown, in order that trends can be shown clearly).

The Eastern Surplus Late states (Maine, N. Y., Penna.) and the Western Surplus Late show nearly identical patterns of growth and decline in production. The Central Surplus Late, however reveals a strikingly different history, indicating a period of decline beginning in 1944. The trend in the Early states (illustrated below) followed that of the Eastern and Western Surplus Late up to 1946, but thereafter turned downward. The Other Late states do not exhibit as clear a curvilinear trend as the other areas; a straight line fits the data better than does a curve, but it is evident that, throughout the entire period, the trend was definitely downward.

Trends in total sales among the major areas followed the trends in production rather uniformly, but trends in commercial sales as shown in figure 3 differed notably. Of particular interest here are the points at which trends reversed direction, and the rates at which they rose or fell. The trend in the 10 Western Surplus Late states rose from the beginning of the selected period until 1946, and then declined. In the Eastern Surplus Late, the peak occured in 1944. In the Central Surplus Late, the history is one of decline practically throughout the whole period.

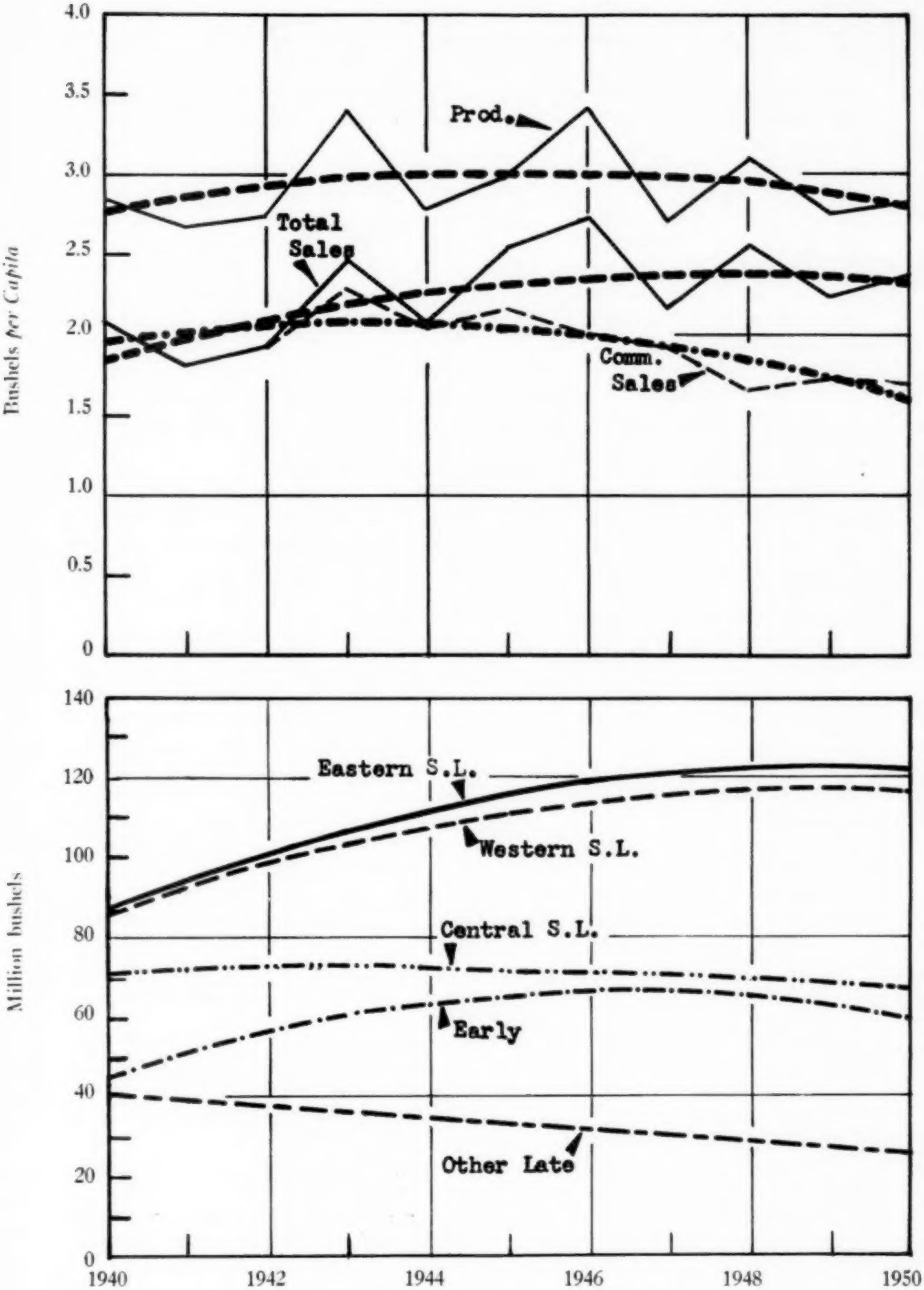


FIGURE 1.—Potato production, total sales, and commercial sales *per capita*, United States, 1940-1950.

FIGURE 2.—Trends in production in the major potato producing areas of the United States, 1940-1950.

The early states show a rising trend in 1948, and thereafter a slight decline. The trend in the Other Late states appears to be straight-line downward throughout the period.

A closer view of production and sales *within* the major areas brings out certain points of interest. The Early states provide one with a good, though not typical example. Developments in this group center around the changes in California on the one hand, and in the southern states, on the other. Figure 4 illustrates trends in the three series in the Early states, but the developments within the group are obscured. Figures 5 and 6 show these latter movements. Of major interest is the expansion in production and commercial sales in California (early crop only), and the decline in the other Early states. (Florida shows a slight upward trend in production and sales throughout the period, but all of the other states indicate declines). The conclusion is obvious that, whatever the cause, California emerged from the period as the leading supplier of early potatoes, whereas the South (excepting Florida) lost ground.

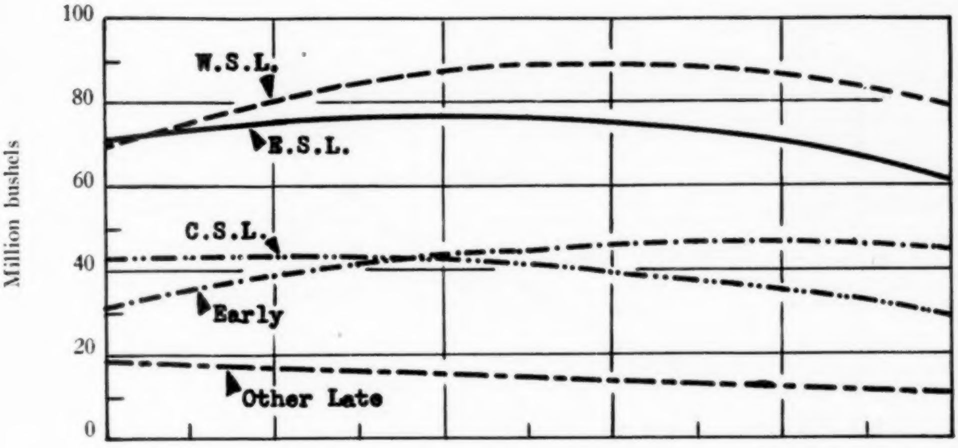
The Intermediate states, taken together, indicate no clearly definable trends over the whole period 1940-1950. However, if the period of heavy purchases (1943-1950) is treated separately, one can discern the pattern of growth and decline in production and sales. New Jersey and Virginia dominate the Intermediate deal, and both states show similar patterns. Figure 7 illustrates developments in New Jersey.

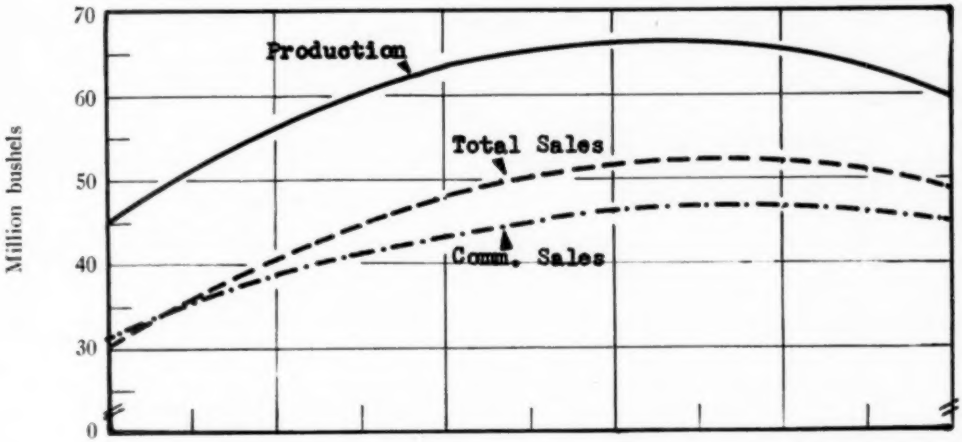
Within the Surplus Late sub-groups, certain states show trends which, although similar to that of the group itself, differ markedly in the relative degrees of growth or decline. This is particularly true of the Eastern and Western Surplus Late areas. The Eastern Surplus Late is made up of Maine, New York (Long Island and Upstate), and Pennsylvania. Reference to figures 8 through 11 indicates that the three states had different histories with respect to production and commercial sales. Pennsylvania (Figure 9) shows a very slight down trend in production and commercial sales with, however, evidence of an upturn at the end of the period. (Pennsylvania had no support program in 1950). New York (Figure 10) shows a moderate uptrend in production and total sales over the whole period. However, from 1946 to 1949, a downtrend in commercial sales is evident. This trend seems about to reverse itself from 1949 to 1950, and the reason seems to be that there was no support program in New York in 1950. This last assumption is perhaps strengthened by referring to the Maine picture, as shown in figure 11.

The Eastern Surplus Late history is most heavily influenced by Maine, both in production and sales. But the trend in Maine's commercial sales continued downward from 1949 to 1950, whereas New York's and Pennsylvania's turned upward. Maine had a support program, and heavy government purchases (35 million bushels) in 1950.

None of the 5 Central Surplus Late states shows any marked departure from the trends for the group. A slight upward trend in production from 1940 to 1943 is apparent, and thereafter a gradual decline is seen. Total sales, however, rose steadily, whereas commercial sales fell sharply. Trends in the Central Surplus Late are shown in figure 12.

The 10 Western Surplus Late states indicate (Figure 13) trends in production and total sales similar to those of the Eastern Surplus Late. Commercial sales, however, do not follow the same pattern. Two over-





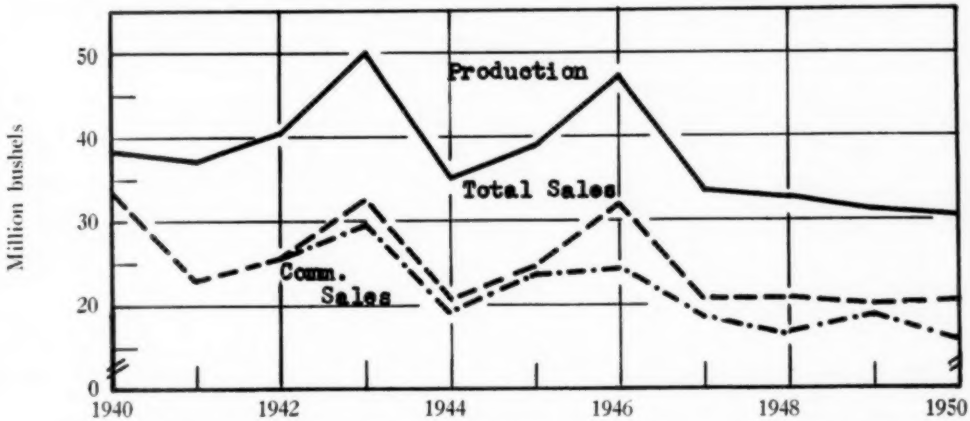


FIGURE 3.—Trends in commercial sales of potatoes among the major producing areas of the United States, 1940-1950.

FIGURE 4.—Trends in production, total sales, and commercial sales in the Early States, 1940-1950.

FIGURE 5.—Production, total sales, and commercial sales in the Early States less California, 1940-1950.

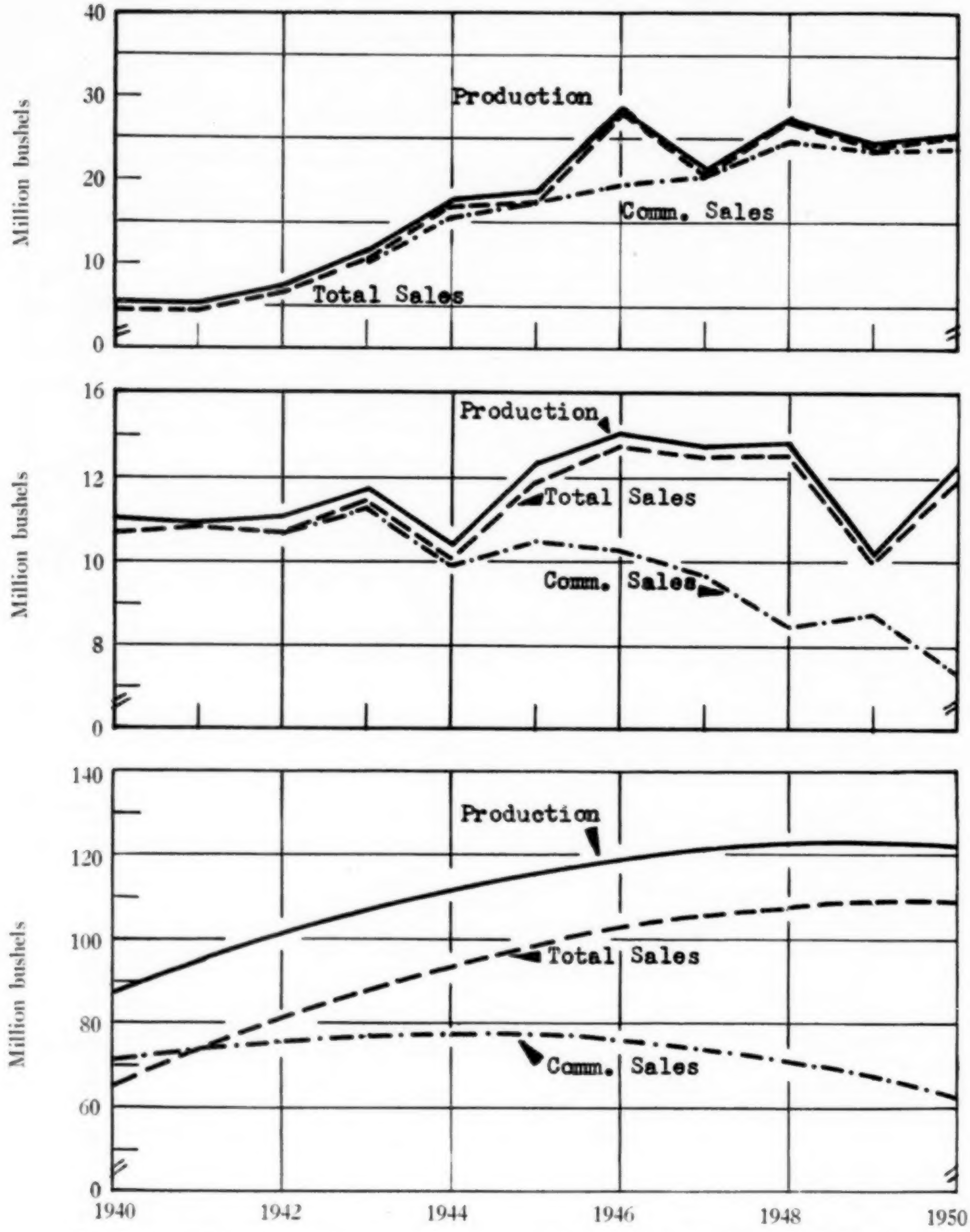


FIGURE 6.—Production, total sales, and commercial sales of early potatoes, California 1940-1950.

FIGURE 7.—Production, total sales, and commercial sales of potatoes, New Jersey, 1940-1950.

FIGURE 8.—Trends in production, total sales, and commercial sales, Eastern Surplus Late states, 1940-1950.

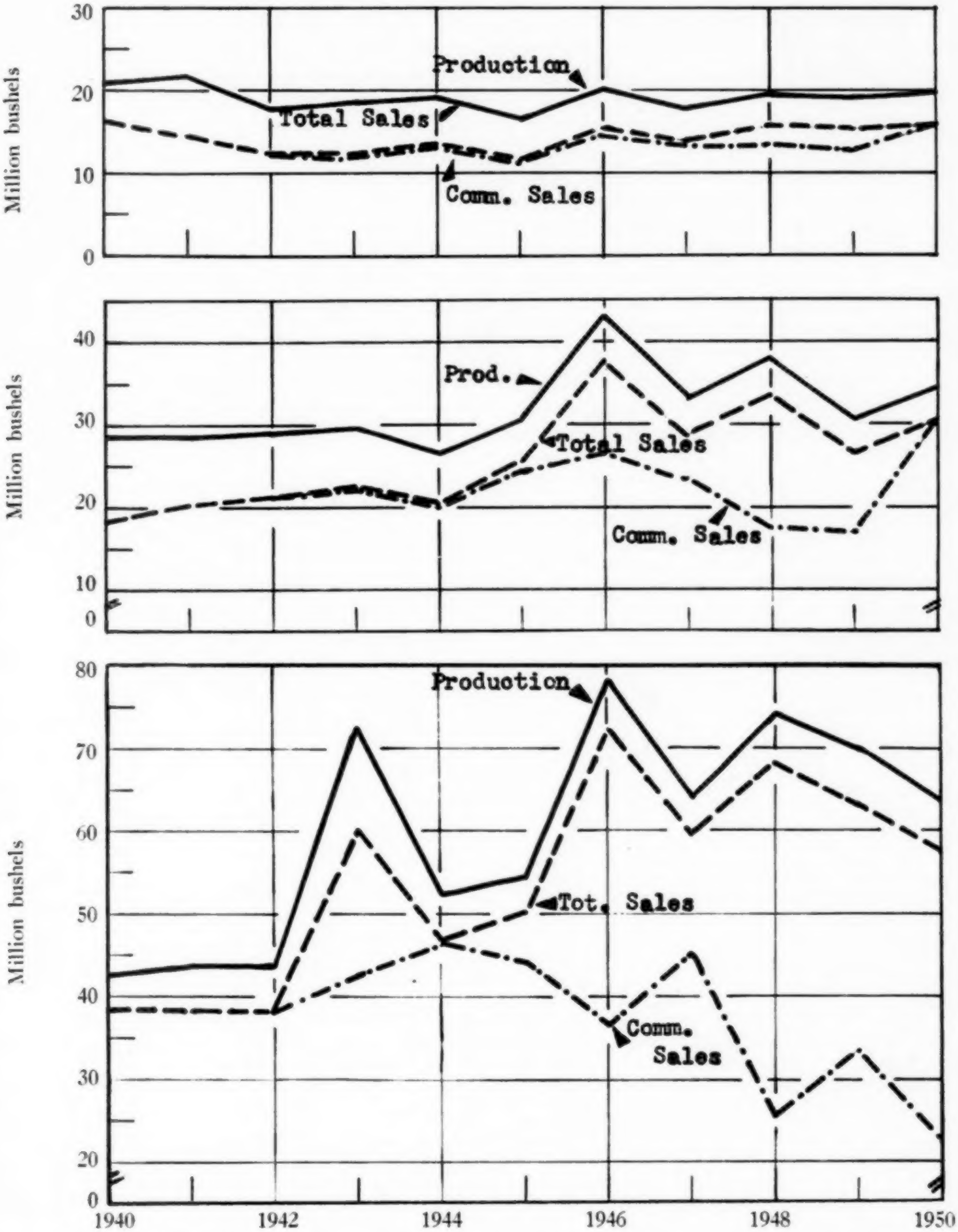


FIGURE 9.—Production, total sales, and commercial sales, Pennsylvania, 1940-1950.
FIGURE 10.—Production, total sales, and commercial sales, New York, 1940-1950.
FIGURE 11.—Production, total sales, and commercial sales, Maine, 1940-1950.

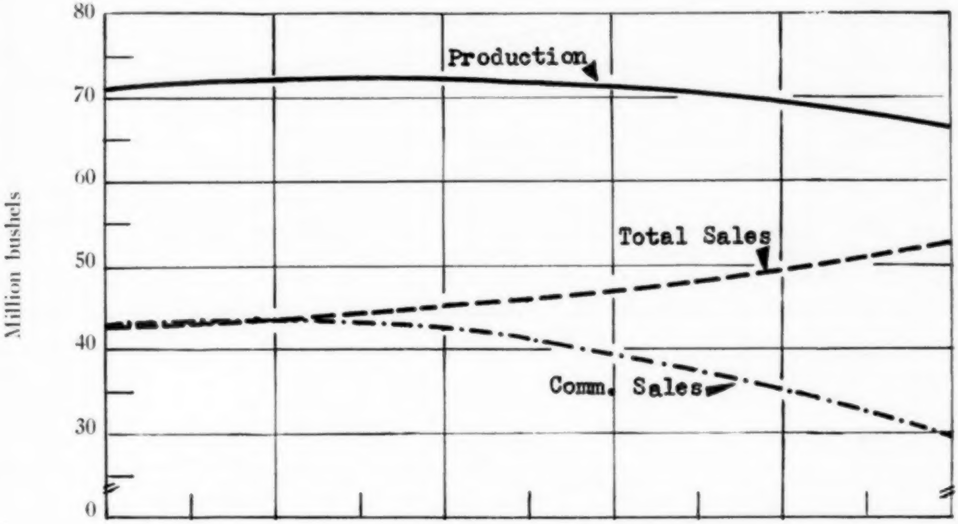
lapping periods seem to stand out in the commercial sales series, the first from 1940 to 1948, and the second from 1946 to 1950. Evidently, commercial sales rose to a peak in 1946, then declined to 1948 or 1949, and thereafter tended to rise again. None of these 10 states appears to show any striking downward trend in production or commercial sales. Colorado and Wyoming indicate a slight decline throughout the period. However, California (Late), Idaho, and Montana evidence slight upward trends. In general, government purchases were not particularly heavy in the Western Surplus Late, save in a few years in several states.

The 11 Other Late states, as a group, reveal similar trends (Figure 14) to those of the United States as a whole, but when data on the Other Late are separated into "New England less Maine", and Other Late "less New England" differences are evident, as shown in figures 15 and 16.

All of the Other Late are deficit areas in production. It is evident that production in the western Other Late declined from 1940 to 1944, and remained fairly steady throughout the remainder of the period. Total and commercial sales, however, show a slightly rising trend from 1944 to 1950.

In the 5 New England deficit states, total and commercial sales show sharply declining trends from 1946, and 1944, respectively. Government purchases in the western Other Late were light, whereas in New England they were heavy, both actually and relatively to the total production of the area. In Massachusetts, for example, 37 per cent of the 1950 crop went to the government, despite the fact that support was not implemented until part of the local early potatoes had been marketed.

It is interesting to note that trends in production, total sales, and commercial sales in Maine and in Massachusetts were very similar.



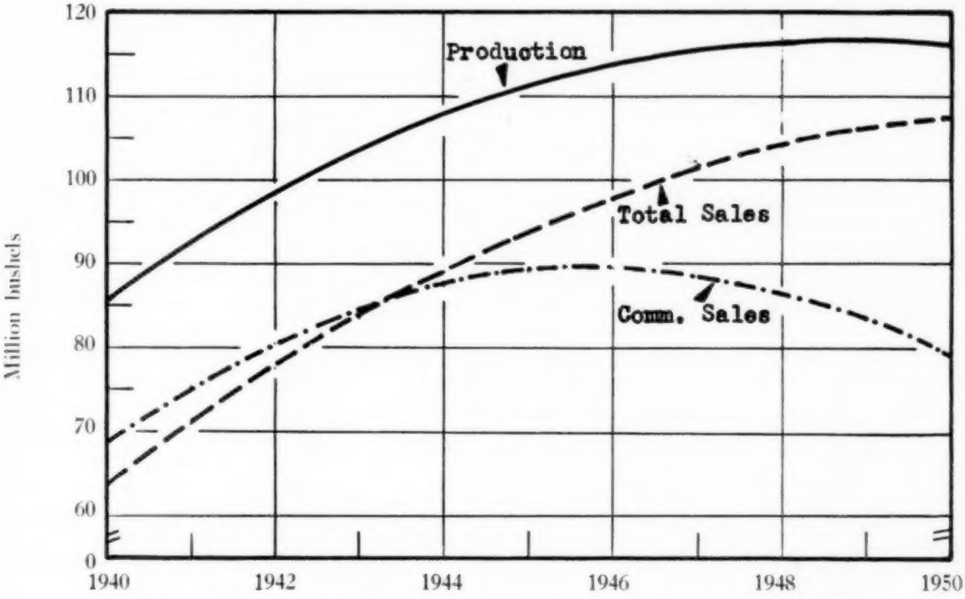
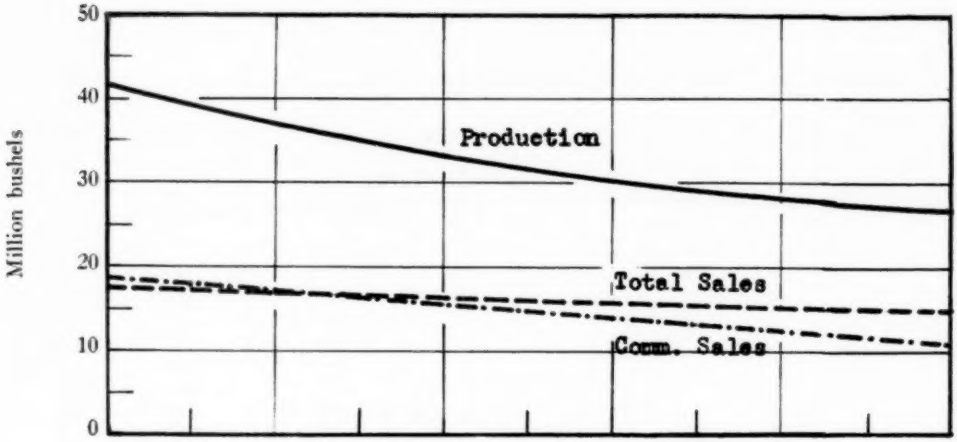
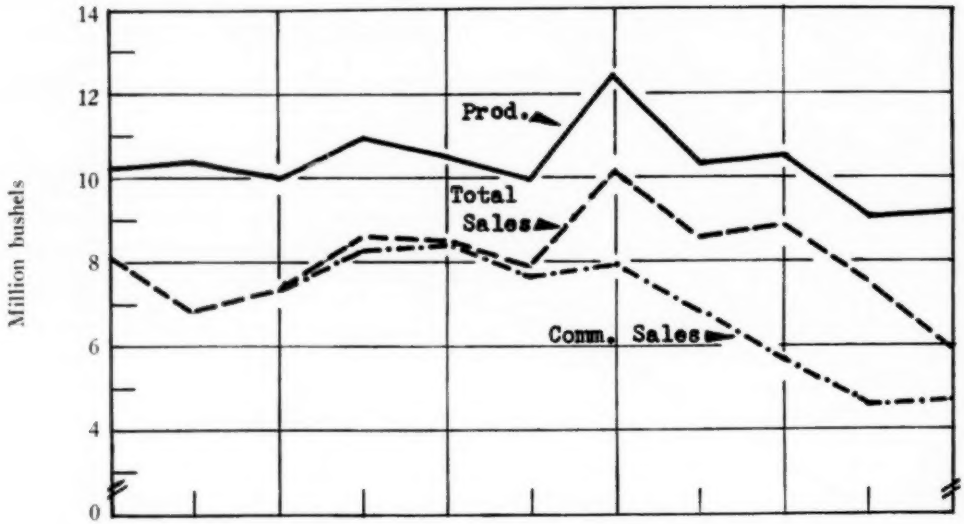


FIGURE 12.—Trends in production, total sales, and commercial sales, Central Surplus Late states, 1940-1950.

FIGURE 13.—Trends in production, total sales, and commercial sales, Western Surplus Late states, 1940-1950.





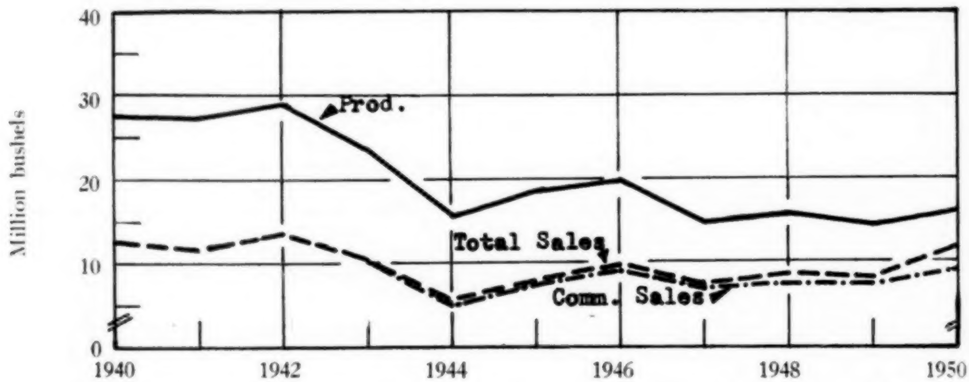


FIGURE 14.—Trends in production, total sales, and commercial sales, Other Late states, 1940-1950.

FIGURE 15.—Production, total sales, and commercial sales, Other Late states, New England, less Maine, 1940-1950.

FIGURE 16.—Production, total sales, and commercial sales, Other Late states, Less New England, 1940-1950.

CONTROL OF INSECTS ATTACKING THE FOLIAGE OF POTATO[1]

J. P. Sleesman[2]

The foliage of potato is subject to injury by a number of insects, the most destructive of which are the potato leafhopper *(Empoasca fabae* Harr.*)*, the potato flea beetle *(Epitrix cucumeris* Harr.*)*, the green peach aphid *(Myzus persicae* Sulz.*)* and the potato aphid *(Macrosiphum solanifolii* Ashm.*)*. The purpose of this paper is to present the results of experiments conducted at the Ohio Agricultural Experiment Station during the period from 1945 to 1952 in an attempt to find materials which more effectively control these insects.

Materials and Methods

The experiments herein reported have been concerned with the effectiveness of DDT, parathion, malathon, DDD, TEPP, chlordane, lindane, methoxychlor, aldrin, dieldrin, EPN, Systox, Pestox 3, toxaphene, Q137, and Dilan when used in combination with a suitable fungicide in the control of insects attacking the Irish Cobbler potato.

All treatments were applied to plots 2 rows wide and either 10 or 50 feet long, replicated at least 4 times in randomized blocks. The sprays were applied to the larger plots with tractor-mounted equipment and to the smaller areas with a wheelbarrow type sprayer at the rate of 160 gallons under a pressure of 300 pounds per square inch. The first application was made when the plants were about 4 inches high and others followed at 10-day intervals until the plants were dead.

Leafhopper populations were determined by counting the nymphs on 10 leaves selected at random from each plot. Since the nymphs seldom leave the plant, they can be counted readily upon an individual leaf, whereas the adult leafhoppers are very active and move freely from plant to plant. Thus, the nymph count was considered to be the better index of relative populations.

Flea beetle populations were not determined by actual count of the insects. The number of adult feeding punctures in a unit area of leaf surface was considered to be a more reliable index to the size of the adult population. A sample of 10 leaflets was selected at random from each plot and the mean number of feeding punctures per leaflet was determined for each treatment.

Aphid and whitefly populations were determined by counting the insects on 10 leaves selected at random from each plot. Since adult whiteflies move rapidly when disturbed, only the nymphs of this species were counted.

The degree of foliage protection was determined by estimating the percentage of dead foliage for each plot on a given date. During the course of these experiments, hopperburn represented the most serious injury to the foliage, but in certain years either early or late blight was a contributing factor.

[1]Accepted for publication March 4, 1953.
[2]Associate Entomologist, Ohio Agricultural Experiment Station, Wooster, Ohio.

Flavor evaluations of the tubers were made according to the procedure outlined by Gould *et al.* (1). One-half bushel samples of tubers were collected at harvest time from each of four replicates for each treatment. These were canned as diced potatoes according to acceptable commercial practices, stored at room temperature for three months and then submitted to taste panels for flavor evaluations. The 1948 samples were taste-tested by panels at Ohio State University, National Canners' Association, and the Campbell Soup Company, and the 1949 samples by the Ohio State University panel.

Presentation of Data

In experiments conducted in Ohio during the period from 1934 to 1944 (2), bordeaux-sprayed plots showed an average yield of 458 bushels per acre, unsprayed plots only 300 bushels per acre. The difference, 158 bushels, represented an increase of 53 per cent due to the degree of insect control that was obtained with this treatment. For this same period, bordeaux-sprayed plants showed an average leafhopper population of 1.2 nymphs per leaf, unsprayed plants, 9.4 nymphs per leaf. The difference, 8.2 nymphs, represented a decrease of 87 per cent in leafhopper population due to the application of bordeaux mixture.

Prior to the time DDT was used on potatoes (3), it was thought that the few leafhoppers remaining on bordeaux-sprayed plants caused little, if any, reduction in yield. Data presented in table 1, however, show that when leafhoppers have been essentially eliminated by the application of DDT the yield obtained was 45 per cent larger than that resulting from the use of bordeaux mixture which permitted from 10 to 15 per cent of the leafhoppers to live. The outstanding performance of DDT in reducing leafhopper populations is reflected not only in higher yields but also in larger, more vigorous vines and increased inflorescence. Some investigators report that the application of DDT to the foliage of potato stimulated growth but data obtained in Ohio tests do not support this contention (4).

Table 2 summarizes the data obtained from plots treated with four different insecticidal formulations. DDT was superior to methoxychlor, DDD, and BHC in the control of the potato leafhopper and the potato flea beetle when all were used at comparable amounts of the active ingredient. The effectiveness of DDT was not decreased when it was combined with bordeaux mixture and copper-lime dust applied freshly mixed, each of which contained an excess of lime. Plots sprayed with DDT produced the highest yields.

Table 3 gives the degree of flea beetle control and yields obtained with DDT wettable powder, DDT emulsifiable concentrate, chlordane, toxaphene, and HETP. Plots sprayed with DDT showed the best flea beetle control, but the yields were not significantly different because of the fact that leafhopper populations were extremely low in the experimental planting. All of the fungicide-insecticide sprayed plots gave significantly better yields than the untreated check plants because early blight was the most important factor in limiting yields.

Table 4 presents data on the reduction of leafhopper populations, amount of feeding by the adult flea beetle, degree of foliage protection, and yields obtained from nine different treatments. Parathion, DDT, DDD,

TABLE 1.—*Leafhopper populations, flea beetle foliage injury, and yield for the treatments shown, based on the means of four replications in each of three separate experiments. McGuffey, Marietta, and Wooster, Ohio, 1945.*

Treatment	Leafhopper Nymphs per Leaf	Flea Beetle Feeding Punctures per Leaflet	Yield per Acre
	No.	No.	Bus.
Zerlate + calcium arsenate, 2-4-100	1.1	9.0	320
Bordeaux 8-8-100 + calcium arsenate, 4 lbs.	.6	10.0	310
COC-S + calcium arsenate, 4½-4-100	.5	8.0	298
Fermate + calcium arsenate, 2-4-100	4.3	8.0	269
Zerlate + DDT 25 per cent WP, 2-3-100	0	2.7	464
Bordeaux 8-8-100 + DDT 25 per cent WP, 3 lbs.	0	4.7	438
COC-S + DDT 25 per cent WP, 4½-3-100	0	3.7	407
Fermate + DDT 25 per cent WP, 2-3-100	0	6.0	428
Untreated check	6.6	31.0	272
Least significant difference at 5 per cent level			62

TABLE 2.—*Flea beetle injury, foliage condition, and yield for the treatments shown, based on the means of four replications in each of three separate experiments. McGuffey, Marietta, and Wooster, Ohio, 1946.*

Treatment	Flea Beetle Holes per Leaflet	Dead Foliage July 26	Yield per Acre
	No.	Per cent	Bus.
8-8-100 bdx.	8.4	57	347
8-8-100 bdx. + methoxychlor 50 per cent WP, 1 lb.	4.3	50	404
8-8-100 bdx. + DDD 50 per cent WP, 1 lb.	5.0	49	384
8-8-100 bdx. + BHC 50 per cent WP, 1 lb.	4.9	52	382
8-4-100 bdx. + DDT 50 per cent WP, 1 lb.	1.8	37	469
8-8-100 bdx. + DDT 50 per cent WP, 1 lb.	1.5	36	468
8-16-100 bdx. + DDT 50 per cent WP, 1 lb.	1.6	36	476
20-80 copper-lime dust + DDT 50 per cent WP, 6 lbs.	1.6	47	440
Untreated check	38.5	81	279
Least significant difference at 5 per cent level			43

TABLE 3.—*Flea beetle populations, flea beetle injury, foliage condition, and yield for the treatments shown, based on the means of four replications in each of three separate experiments. McGuffey, Marietta, and Wooster, Ohio, 1947.*

Treatment	Adult Flea Beetles per 10 Sweeps of Net	Flea Beetle Feeding Punctures per Leaflet	Dead Foliage July 25	Yield per acre
	No.	No.	Per cent	Bus.
Bordeaux, 8-8-100	13.5	6.4	62	533
Bordeaux, 8-8-100 + DDT 50 per cent WP, 1 lb.	4.8	1.9	46	584
COC-S + DDT 50 per cent WP, 4-1-100	1.5	2.2	51	560
COC-S + chlordane 50 per cent WP, 4-1-100	9.9	4.8	52	553
COC-S + toxaphene 25 per cent WP, 4-3-100	6.5	2.0	51	550
COC-S + HETP, 4-1-100	13.4	6.1	60	507
COC-S + DDT Em. 25 per cent, 4-2-100	6.8	1.7	52	557
Untreated check	41.0	19.8	80	454
Least significant difference at 5 per cent level				55

and methoxychlor gave comparable yields and equally good control of leafhoppers and flea beetles. Chlordane, lindane, and rotenone gave relatively poor control of leafhoppers, and the tops of plants treated with these materials were the first to die, resulting in lower yields.

Table 5 summarizes the data obtained from plots treated with 13 different insecticidal formulations. All of the various insecticides gave about the same degree of protection against the adult flea beetle with the exception of aldrin which was superior in this respect to the other materials tested. Toxaphene, lindane, chlordane, and aldrin were inferior to parathion, DDT, methoxychlor, and Dilan in the control of leafhoppers. Parathion gave good control of whiteflies and both parathion and lindane effectively controlled aphids.

Table 6 gives data comparing the performance of 14 different insecticides in controlling leafhoppers, flea beetles, and aphids. DDT, parathion, Dilan, methoxychlor, and Q137 gave good control of leafhoppers and flea beetles and plots treated with these materials produced the highest yields. Parathion, lindane, Pestox 3, and malathon gave excellent control of aphids.

Table 7 summarizes the data obtained from plots sprayed with seven different insecticidal formulations, all of which gave good control of leafhoppers with the exception of dieldrin. Dieldrin, however, was superior

TABLE 4.—*Leafhopper populations, flea beetle injury, foliage condition, and yield for the treatments shown, based on the means of five replications. Wooster, Ohio, 1948.*

Treatment[1]	Formulae	Leaf-hopper Nymphs per Leaf July 19	Flea Beetle Holes per Leaflet July 20	Blossoms per 10 Plants Aug. 30	Dead Foliage Aug. 30	Yield per Acre
	Lbs.-Gals.	No.	No.	No.	Per cent	Bus.
Parathion 25 per cent WP	2-100	0	3	26	36	942
TEPP 40 per cent	¼-100	0	15	24	50	833
Chlordane 40 per cent WP	2-100	5.6	18	6	70	743
Lindane 50 per cent WP	1-100	5.9	8	9	62	792
Methoxychlor 50 per cent WP	2-100	0	5	24	62	798
DDD 50 per cent WP	2-100	0	19	22	50	860
DDT technical 50 per cent WP	1-100	0	5	22	46	833
DDT purified 50 per cent WP	1-100	0	8	22	60	860
Rotenone 4 per cent	5-100	10.7	36	1	86	523
Untreated check	——	15.9	206	1	100	362
Least significant difference at 5 per cent level						93

[1]All insecticides were combined with Zerlate, 2-100.

to the other insecticides used in this experiment in the control of flea beetles.

Table 8 shows the results obtained when a combination Tribasic-DDT formulation was applied to potatoes at 40 gallons per acre and a pressure of 80 pounds per square inch in comparison with the standard rate of 160 gallons per acre at 300 pounds pressure. The formulation applied at 40 gallons per acre was prepared to contain four times as much of the active ingredient (4X concentration) as that applied at 160 gallons (X concentration) per acre. The data show that under the conditions of these experiments the 4X concentration gave results that were equally as good as those obtained with the X concentration.

Tables 9 and 10 summarize the data obtained by various taste panels in evaluating the flavor of canned samples of potatoes harvested from plots sprayed with different insecticides in 1948 and 1949. All panels concerned in evaluating the samples were in complete agreement that potatoes harvested from lindane-treated plots were off-flavor. In other instances the data were less conclusive. The Campbell Soup Company and the Ohio State University panels detected an off-flavor in the 1948 samples of DDD-treated potatoes but the Ohio State University panel failed to

TABLE 5.—*Leafhopper populations, flea beetle injury, aphid populations, whitefly populations, and yield for the treatments shown, based on the means of five replications. Wooster, Ohio, 1949.*

Treatment[1]	Formulae	Leaf-hopper Nymphs per Leaf Aug. 2	Flea Beetle Holes per Leaflet Aug. 2	Aphid Population July 26	Whitefly Nymphs per Leaf	Yield per Acre
	Lbs.-Gals.	No.	No.	Class[2]	No.	Bus.
DDT technical 50 per cent WP	1-100	0	19	2	231	506
DDT purified 50 per cent WP	1-100	0	17	2	—	517
DDD 50 per cent WP	2-100	0	22	2	—	475
Chlordane 40 per cent WP	2-100	0.7	16	2	—	508
Toxaphene 25 per cent WP	2-100	.2	16	1	—	535
Lindane 25 per cent WP	1-100	.3	12	0	—	503
Parathion 25 per cent WP	1-100	0	21	0	0	573
Aldrin 25 per cent WP	1-100	2.9	5	2	101	406
Methoxychlor 50 per cent WP	2-100	0	18	3	—	496
CS 645A 25 per cent Em.	1-100	0	18	2	—	479
Dilan 25 per cent Em.	1-100	0	14	2	—	522
Rotenone 4 per cent	5-100	12.8	18	1	—	331
Untreated check	——	15.4	142	1	274	349
Least significant difference at 5 per cent level						63

[1] All insecticides were combined with Zerlate, 2-100.

[2] Classes of aphid populations: 0 = none; 1 = 1 to 25 per leaf; 2 = 26 to 100 per leaf; 3 = 101 and up per leaf.

detect an off-flavor in the 1949 samples of potatoes sprayed with the same material. Samples harvested from plots sprayed with chlordane and parathion in 1948 were found to be off-flavor by the Campbell Soup Company but not by the Ohio State University and National Canners Association panels. The Ohio State University panel scored the 1949 chlordane- and parathion-treated samples as satisfactory but detected an off-flavor in the samples harvested from plots sprayed with toxaphene and Dilan.

TABLE 6.—*Flea beetle injury, degree of hopperburn, aphid populations, and yield for the treatments shown, based on the means of six replications. Wooster, Ohio, 1950.*

Treatment	Formulae	Flea Beetle Holes per Leaflet	Hopper-burn	Aphid Popula-tion	Yield per Acre
	Lbs.-Gals.	No.	Class[1]	Class[2]	Bus.
DDT purified 50 per cent WP	1-100	5.9	O	H	675
Methoxychlor 50 per cent WP	2-100	4.4	O	H	638
Parathion 15 per cent WP	1-100	7.9	O	O	733
EPN 25 per cent WP	0.6-100	8.8	L	H	645
Chlordane 50 per cent WP	2-100	6.9	M	M	561
Lindane 25 per cent WP	1-100	7.0	M	O	537
Dilan 25 per cent Em.	1-100	8.2	O	H	688
CS 728 25 per cent Em.	1-100	8.5	M	H	597
Q137 50 per cent WP	1-100	7.7	O	H	641
BPR Em.	4-100	11.9	M	M	489
Pestox 3 45 per cent Em.	2-100	13.5	L	O	578
Aldrin 25 per cent WP	1-100	6.8	M	M	443
Malathon 50 per cent Em.	2-100	12.2	L	O	649
Rotenone 4 per cent	5-100	9.8	M	M	564
Untreated check	—	15.5	H	M	402
Least significant difference at 5 per cent level					129

[1]Hopperburn classes: O = none; L = light; M = medium; H = heavy.

[2]Population classes: O = no infestation; L = light infestation; M = medium infestation; H = heavy infestation.

SUMMARY

Data obtained in experiments conducted during the past eight years for the purpose of evaluating newer organic insecticides in the control of foliage-feeding insects are presented.

Field tests in 1944, 1945, and 1946 showed that the application of DDT to potato plants resulted in a greater reduction in leafhopper and flea beetle populations, more vigorous vine growth, and significantly higher yields than was obtained with any material recorded for use on potatoes since the introduction of bordeaux mixture. During this period, plots sprayed with DDT-bordeaux mixture gave an average yield of 433 bushels per acre, bordeaux-sprayed plots only 313 bushels per acre. The difference, 120 bushels, represented an increase of 38 per cent due to DDT treatment. The application of DDT eliminated the leafhopper as a factor in limiting yields and gave a 66 per cent greater reduction in adult flea beetle injury

TABLE 7.—*Leafhopper populations, flea beetle injury, and yield for the treatments shown, based on the means of four replications. Wooster, Ohio, 1952.*

Treatment	Formulae	Leafhopper Nymphs per Leaf	Flea Beetle Holes per Leaflet	Yield per Acre
	Lbs.-Gals.	No.	No.	Bus.
Malathon 25 per cent WP	2-100	0	25	507
Malathon Em. E-20 50 per cent	1-100	0	21	539
Malathon Em. E-21X 50 per cent	1-100	0	27	511
Parathion 25 per cent WP	1.5-100	0	19	501
Dieldrin 25 per cent WP	2-100	2.3	4	536
Systox 48.1 per cent Em.	1.5-100	0	13	609
Methoxychlor 50 per cent WP	2-100	0	16	486
Untreated check	—	3.7	27	352
No significant differences in yield.				

TABLE 8.—*The comparative performance of regular and low-gallonage applications of DDT-Tribasic mixture to potatoes. Wooster, Ohio, 1952.*

Rate of Application	Bushels per Acre			Leafhopper Nymphs per Leaf 1949	Flea Beetle Holes per Leaflet 1949
	1949	1950	1951		
Gals./Acre				No.	No.
160 (X)	378	342	383	0	19.5
40 (4X)	384	357	419	0	18.0
No treatment	280	......	......	13.6	43.9

than was obtained with bordeaux plus calcium arsenate.

The results of experiments reported herein and of those published elsewhere have shown DDT to be compatible with low-lime bordeaux, high-lime bordeaux, fixed copper compounds, copper-lime dust (applied freshly mixed), ziram, zineb, and nabam. In general, better flea beetle control was obtained when DDT was combined with bordeaux mixture than when it was used with other fungicides.

DDT, parathion, malathon, methoxychlor, DDD, Q137, Dilan, and Systox, at the concentrations used in these experiments, reduced the leafhopper nymph population to zero and gave equally good yields. Chlordane, toxaphene, lindane, aldrin, dieldrin, EPN, and Pestox 3 gave relatively poor control of the potato leafhopper. TEPP gave good initial kill of leafhoppers but it had little residual action.

TABLE 9.—*Effect of the insecticidal treatments shown on the flavor of canned potatoes when applied as foliage sprays. Wooster, Ohio, 1948.*

Treatment	Formulae	Flavor Evaluations by		
	Lbs.-Gals.	Campbell Soup[1]	National Canners[2]	Ohio State University[3]
Parathion 25 per cent WP	2-100	33	1.7	9.00
TEPP 40 per cent	¼-100	100	1.5	9.11
Chlordane 40 per cent WP	2-100	33	1.3	8.94
Lindane 50 per cent WP	1-100	0	2.4	4.78
Methoxychlor 50 per cent WP	2-100	100	1.3	8.94
DDD 50 per cent WP	2-100	17	1.4	8.61
DDT technical 50 per cent WP	1-100	67	1.2	9.11
DDT purified 50 per cent WP	1-100	67	1.3	9.11
Rotenone 4 per cent	5-100	67	1.5	8.83
Untreated check	——	100	1.0	9.50
Least significant difference at 1 per cent level				.67

[1]Score of less than 66 indicates objectionable flavor.
[2]Score of 1 indicates normal flavor; 2, trace of off-flavor; 3, definite off-flavor.
[3]Data statistically analyzed.

TABLE 10.—*Effect of the insecticidal treatments shown on the flavor of canned potatoes when applied as foliage sprays. Wooster, Ohio, 1949.*

Treatment	Formulae Lbs.-Gals.	Mean Flavor Evaluations
DDT technical 50 per cent WP	1-100	7.71
DDT purified 50 per cent WP	1-100	7.64
DDD 50 per cent WP	2-100	7.36
Chlordane 40 per cent WP	2-100	6.64
Toxaphene 25 per cent WP	2-100	5.80
Lindane 25 per cent WP	1-100	4.28
Parathion 25 per cent WP	1-100	7.21
Aldrin 25 per cent WP	1-100	7.78
Methoxychlor 50 per cent WP	2-100	7.36
CS 645A 25 per cent Em.	1-100	7.36
Dilan 25 per cent Em.	1-100	5.86
Rotenone 4 per cent	5-100	6.38
Untreated check	——	7.14
Least significant difference at 1 per cent level		.88

DDT, aldrin, and dieldrin were superior to the other compounds tested in the control of the potato flea beetle.

Parathion, malathon, lindane, Systox, and Pestox 3 gave good control of aphids. Parathion, the only material in this group tested against the whitefly, gave excellent control of this insect.

Application of a DDT-Tribasic formulation at the rate of 40 gallons (4X concentration) per acre gave results comparable to those obtained with the standard rate of 160 gallons (X concentration) per acre.

Flavor evaluations showed that the application of lindane to the foliage of potatoes imparted an off-flavor to the tubers. Samples from plots sprayed with DDD, toxaphene, chlordane, and Dilan were found to be off-flavor by some of the panels, but the data were inconclusive because of variability.

Literature Cited

1. Gould, Wilbur A., J. P. Sleesman, Roy W. Rings, Margaret Lynn, Fred Krantz, Jr., and H. D. Brown. 1951. Flavor evaluations of canned fruits and vegetables treated with newer organic insecticides. Food Technology 5(4): 129-133.
2. Sleesman, J. P. and J. D. Wilson. 1943. Comparison of fixed coppers and bordeaux mixture in the control of insects and diseases on muck-grown Irish Cobbler potatoes. Ohio Agr. Exp. Sta. Bimonthly Bull. *28*(*223*) :173-183.
3. H. L. Gui, and J. D. Wilson. 1945. DDT and other new materials for spraying potatoes. Amer. Potato Jour. *22*(8) :242-250.
4. Wilson, J. D. and J. P. Sleesman. 1948. Pesticides — A study of their effects on the growth and transpiration of cucumber, tomato, and potato plants. Ohio Agr. Exp. Sta. Bull. 676.

PROGRAM OF THE ANNUAL MEETING OF THE POTATO ASSOCIATION OF AMERICA

September 7, 8, 9, 1953

Madison, Wisconsin

Monday Morning, September 7, 1953
Room 105, Mechanical Engineering Building, 8:30 A.M.

Session 1
R. H. LARSON, **Chairman**
Symposium: Potato Viruses

8:30 — 1. **The Witches' Broom Virus Disease of Potatoes.** (Illustrated 2 x 2). N. S. WRIGHT, Canadian Department of Agriculture, Vancouver, B. C., Canada.

9:00 — 2. **Potato, Interveinal Mosaic.** (Illustrated 2 x 2). R. H. LARSON, University of Wisconsin, Madison, Wis.

9:15 — 3. **Strains of Potato Virus Y.** (Illustrated 2 x 2). KARL M. SILBERSCHMIDT, E. ROSTON and C. M. ULSON. Instituto Biologico, Sao Paulo, Brazil.

9:30 — 4. **Potato Virus A.** (Illustrated 2 x 2). D. S. MAC LACHLAN, Department of Agriculture, Ottawa, Canada, R. H. LARSON and J. C. WALKER, University of Wisconsin, Madison, Wis.

10:00 — 5. **Aster Yellows (Purple-Top) of Potatoes.** (Illustrated 2 x 2). D. J. MAC LEOD, Department of Agriculture, Fredericton, New Brunswick, Canada.

10:30 — 6. **Virus X Resistance in Potatoes.** (Illustrated 2 x 2). W. J. HOOKER, C. E. PETERSON, and R. G. TIMIAN, Iowa State College, Ames, Iowa.

11:00 — 7. **The Maintenance of Virus X — Free Stocks of Potatoes.** (Illustrated 2 x 2). J. MUNRO, Department of Agriculture, Fredericton, New Brunswick, Canada.

11:30 — Discussion: **Virus Resistance in Potatoes,** W. J. HOOKER, R. H. LARSON, D. S. MAC LACHLAN, J. MUNRO and K. M. SILBERSCHMIDT.

Monday Afternoon, September 7
Room 105, Mechanical Engineering Building, 1:30 P.M.

Session 2
M. E. GALLEGLY, **Chairman**
Symposium: Potato Late Blight Resistance

1:30 — 1. **W—Variety Resistance to Late Blight.** R. V. AKELEY, U. S. Department of Agriculture, Beltsville, Md.

2:00 — 2. **Late Blight Resistance Work in Scotland.** WILLIAM BLACK, Scottish Plant Breeding Station, Edinburgh, Scotland.

2:30 — 3. **Testing for Late Blight Resistance in Canada.** J. L. HOWATT, and W. A. HODGSON, Department of Agriculture, Fredericton, New Brunswick, Canada.

3:00 — 4. **Late Blight Resistance Work in New York and Pennsylvania.** W. R. MILLS and L. C. PETERSON, Pennsylvania State College, State College, Pa., and Cornell University, Ithaca, N. Y.

3:30 — 5. **Late Blight in Mexico.** JOHN S. NIEDERHAUSER, Rockefeller Foundation in Mexico, Mexico, D. F., Mexico.

4.00 — Discussion: **The Future of Breeding for Late Blight Resistance.** W. R. MILLS, JOHN S. NIEDERHAUSER, WILLIAM BLACK, W. A. HODGSON, and R. V. AKELEY.

Monday Evening, September 7, Banquet – 6:30 P.M.
Tripp Commons, Memorial Union Building

Tuesday Morning, September 8
Room 105, Mechanical Engineering Building, 8:30 A.M.
Business Meeting

J. H. MUNCIE, **President, Presiding**

Tuesday Afternoon, September 8
Joint Session with American Society for Horticultural Science
Room 105, Mechanical Engineering Building, 1:30 P.M.

Session 4
JULIAN MILLER, **Chairman**

1:30 — 1. **Studies on the Development of Color in Potato Chips II. Relative Rate of Browning of Some Constituents in the Potato.** (Illustrated 2 x 2). R. S. SHALLENBERGER and ORA SMITH, Cornell University, Ithaca, N. Y.

1:45 — 2. **Studies on the Development of Color in Potato Chips III. Effects of Several Amino Acids and Sugars on Discoloration in Chips.** (Illustrated 2 x 2) ORA SMITH and R. S. SHALLENBERGER, Cornell University, Ithaca, N. Y.

2:00 — 3. **Potato Quality — What Does it Mean?** N. M. PARKS, Department of Agriculture, Ottawa, Canada.

2:15 — 4. **The Effect of Harvest Date on the Yield and Specific Gravity of Potato Varieties Grown in Alaska.** (Illustrated 3¼ x 4). ZOLA M. FINEMAN, Dugway Proving Grounds, Tooele, Utah.

2:30 — 5. **The Treatment and Packaging of Pre-Peeled Potatoes.** (Illustrated 3¼ x 4). R. H. TREADWAY, Eastern Regional Research Laboratory, Philadelphia 18, Pa., and R. L. OLSEN, Western Regional Research Laboratory, Albany 6, Calif., U.S.D.A.

2:45 — 6. **Yearly and Every-Other-Year Treatments with Dichloropropene-Dichloropropane and Ethylene Dibromide in Relation to Potato Yields and Soil Populations of the Golden Nematode, *Heterodera rostochiensis*, Wollenweber.** (Illustrated 2 x 2). W. F. MAI and BERT LEAR, Cornell University, Ithaca, N. Y.

3.00 — 7. **Aphid Resistance in Potatoes II.** L. A. DIONNE and J. B. ADAMS, Field Crop Insect Laboratory, Fredericton, N. B., Canada.

3:15 — 8. **Influence of Spray Schedule Variations on Potato Yield and Quality.** D. WILSON, J. P. SLEESMAN, and W. A. GOULD, Ohio Agricultural Experiment Station, Wooster, Ohio.

3:30 — 9. **Methods for Determining Scab Resistance in the Potato.** G. H. RIEMAN and D. C. COOPER, University of Wisconsin, Madison, Wis.

3:45 — 10. **Rate of Oxygen Absorption by Potato Roots.** (Illustrated 3¼ x 4). JOHN BUSHNELL, Ohio Agricultural Experiment Station, Wooster, Ohio.

4:00 — 11. **Tuberization and Modification of Its Stimulus in the Potato.** E. J. KENNEDY and ORA SMITH, Cornell University, Ithaca, N. Y.

4:15 — 12. **Gas Diffusion through Normal and Wound Periderm of the Potato.** (Illustrated 2 x 2). R. L. SAWYER and ORA SMITH, Cornell University, Ithaca, N. Y.

Wednesday Morning, September 9
Room 105, Mechanical Engineering Building, 9:00 A.M.

Session 5
C. W. FRUTCHEY, **Chairman**

9:00 — 1. **Fertilizer Placement Methods in Potato Production.** JOHN C. CAMPBELL, New Jersey Agricultural Experiment Station, New Brunswick, N. J.

9:20 — 2. **Phosphorus Fertilization of Some New England Potato Soils.** KENNETH F. NIELSEN, Maine Agricultural Experiment Station, Orono, Maine.

9:40 — 3. **Effect of Potassium Carriers and Phosphate-Potash Ratios on the Yield and Quality of Potatoes Grown on Organic Soils.** ROBERT E. LUCAS, E. J. WHEELER, and J. F. DAVIS, Michigan State College, East Lansing, Mich.

10:00 — 4. **Potato Production in Florida as Influenced by Soil Acidity and Nitrogen Sources.** G. M. VOLK, University of Florida, Gainesville, Fla.

10:20 — 5. **Changing Potato Fertilizer Practices in New England.** ARTHUR HAWKINS, University of Connecticut, Storrs, Conn.

10:40 — 6. **Nutrient Unbalance and Toxicities in Potatoes.** K. C. BERGER, University of Wisconsin, Madison, Wis.

11:00 — 7. **Effect of Zinc on Virus Infected Potatoes.** G. H. LANE and C. W. FRUTCHEY, Colorado Agricultural Experiment Station, Fort Collins, Colo.

Wednesday Morning, September 9
Room 155, Mechanical Engineering Building, 9:00 A.M.

Session 6
J. W. SCANNELL, **Chairman**

9:00 — 1. **Comparative Effects of Catechol, Some Related Compounds and Other Chemicals on Suberization of Cut Potato Tubers.** A. O. SIMONDS, G. JOHNSON, and L. A. SCHAAL, Colorado Agricultural Experiment Station, Fort Collins, Colo.

9:15 — 2. **Effect of Maleic Hydrazide on Storage Response of the Potato.** (Illustrated 2 x 2). E. J. KENNEDY and ORA SMITH, Cornell University, Ithaca, N. Y.

9:30 — 3. **Effect of Tuberization on Flower Production in the Potato.** MARK MARTIN and ORA SMITH, Cornell University, Ithaca, N. Y.

9:45 — 4. **Microsporogenesis, Pollen Fertility, Seed Setting and the Nature of Polyploidy in Certain Commercial Potato Varieties.** (Illustrated 3¼ x 4). M. S. SWAMINATHAN, D. C. COOPER and R. W. HOUGAS, University of Wisconsin, Madison, Wis.

10:00 — 5. **Strains of Potato Virus Y in British Potato Varieties.** J. MUNRO, Department of Agriculture, Fredericton, New Brunswick, Canada.

10:15 — 6. **Storage of Potato Pollen.** (Illustrated 2 x 2). R. W. HOUGAS and KATHERINE BEAMISH, University of Wisconsin, Madison, Wis.

10:30 — 7. **Studies of Seed Set Failure in the Sebago and Chippewa Varieties.** BETTY WILLIAMS, University of Wisconsin, Madison, Wis.

10:45 — 8. **Set Seed in Crosses of Diploid and Tetraploid Solanums with *S. demissum*.** KATHERINE BEAMISH, University of Wisconsin, Madison, Wis.

11:00 — 9. **Oxygen and Dormancy in the Potato Tuber.** (Illustrated 2 x 2). R. L. SAWYER and ORA SMITH, Cornell University, Ithaca, N. Y.

11:15 — 10. **Studies in the Inheritance of Resistance to *Phytophthora infestans* in Potatoes.** A. CASTRONOVO, University of Minnesota, St. Paul, Minn.

Wednesday Afternoon, September 9
Joint Session with the American Phytopathological Society
Memorial Union Theater

Session 7
J. C. WALKER, **Chairman**

2:00 — **SECTION A.** Joint Symposium with the American Institute of Biological Sciences and Potato Association of America on Cooperative Agricultural Research in the Western Hemisphere.

I — **Potato and Tomato Viruses and Late Blight in the Americas.**

a. **Late Blight in Mexico and Its Implications.** JOHN NIEDERHAUSER, The Rockefeller Foundation, Mexico, D. F. Mexico.

b. **Late Blight Resistance. Present Status.** L. E. HEIDERICK, The Rockefeller Foundation, Bogota, Columbia, S. A.

c. **South American Species and Races of Solanaceae and Disease Control.** CARLOS OCHOA, Department of Agriculture of Peru, Hunacayo, Peru, S. A.

d. **Disease Control in the Tomato.** S. P. DOOLITTLE, U. S. Department of Agriculture, Beltsville, Md.

e. **Potato Viruses in the Americas.** K. SILBERSCHMIDT, Department of Agriculture Biological Institute, Sao Paulo, Brazil, S. A.

II — People, Pathogenes and Progress in International Disease Control, E. C. STAKMAN, University of Minnesota, St. Paul, Minn.

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